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Operating Instructions

DB40

Thermal mass flowmeter and counter for gasses

DB40 Consumption Sensor

Stationary and mobile
flow and consumption measurement
for compressed air and gases



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INTRODUCTION

Dear customer,

Thousands of customers buy our high standard products every year. There are a few good reasons for doing so:

- The cost-performance ratio - reliable quality at a fair price.
- We have the ideal solutions for your measuring tasks based on our expert experience gained over 20 years.
- Our high quality standard.
- Of course, our instruments carry the CE symbol required by the EU.
- We issue calibration certificates and hold seminars.
- Also after the purchase we do not leave you out in the cold - we offer a good after sales service.

Our service guarantees fast help.



Measuring instrument conforms with **DIN EN 61326**



Please read carefully before starting the device!

The consumption sensor DB40 measures the flow velocity (calorimetric principle) in the middle of the pipe. Please observe mounting instruction and inlet section = 15 x inner diameter and outlet section = 5 x inner diameter.

The final values of the measuring ranges are as follows:

DB40 standard version 92.7 m/s, please take the flow rates from the tables on pages 10-11

DB40 H1 - version 185 m/s, please take the flow rates from the tables on pages 12-13

DB40 H2 - version 224 m/s, please take the flow rates from the tables on pages 14-15

1. DB40 with display with 4... 20 mA analogue and pulse output

Please enter inner diameter of the pipe!

Values indicated in the display:

Actual value in m³/h, m³/min etc.

Counter in m³ resp. l

as well as pulse output, 1 pulse per m³ resp. l

are calculated according to the set diameter. Please take the analogue value for flow rate 4... 20 mA from the tables on pages 10 to 15.

4 mA always corresponds with the starting value 0 m³/h, 0 m³/min. The final value 20 mA can be taken from the tables on pages 10 to 15.

Example DB40 Standard:

1" with inner diameter 25.0 mm, 4 mA = 0 m³/h and 20 mA = 122.2 m³/h

2" with inner diameter 53.1 mm, 4 mA = 0 m³/h und 20 mA = 600.0 m³/h

2. DB40 without Display with 4... 20 mA analogue output (without pulse output)

No adjustments are necessary at the consumption sensor.

The respective final values for the flow rate can be taken from the tables on the pages 10 to 15. 4 mA is always set as scaling value 0. 20 mA is the final value .

Example DB40 Standard:

1" with inner diameter 25.0 mm, 4 mA = 0 m³/h and 20 mA = 122.2 m³/h

2" with inner diameter 53.1 mm, 4 mA = 0 m³/h und 20 mA = 600.0 m³/h



Please read carefully before starting the device!

Warning:

Do not exceed the pressure range of 50 bar. From 10 bar we recommend to use the high-pressure protection for a safe installation and removal.

Observe the measuring ranges of the sensor!

Overheating destroys the sensor.

Observe the admissible storage and transportation temperature as well as the permitted operating temperature (e. g. protect the instrument from direct insolation).

Always observe the direction of flow when positioning the sensor!

The safety ring at the sensor head must always remain undamaged and sit correctly in the destined slot.

The screwed fixture must be pressure tight.

The adapter sleeve must be tightened with a torque of 20 to 30 Nm.

It is absolutely necessary to avoid condensation on the sensor element or water drops in the measuring air as they may cause faults .

The lengths of the inlet and outlet sections must not fall below the specified minimum values as this causes increased deviations in the measuring results.

The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or non-compliance with these instructions. Should the device be tampered with in any matter other than a procedure which is described and specified in the manual, the warranty is cancelled and the manufacturer is exempt from liability.

The device is destined exclusively for the described application.

We offer no guarantee for the suitability for any other purpose and are not liable for errors which may have slipped into this operation manual. We are also not liable for consequential damage resulting from the delivery, capability or use of this device.

We offer you to take back the instruments of the instruments family DB40 which you would like to dispose of.

Adjustments and calibrations should only be carried out by qualified employees from the measurement and control technology branch.

Measured variables:	m ³ /h, m ³ /min, l/min or cfm, m/s (standard: DIN 1945, ISO 1217 at 20°C and 1000 mbar) mass flow on request (kg/s, kg/min, kg/h)
Principle of measurement:	calorimetric measurement
Sensor:	Pt45, Pt1000
Measuring medium:	Air, gases
Operating temperature:	-30 ... 140°C probe tube -30 ... 80 °C housing
Operating pressure:	up to 50 bar
Analogue output:	4 ... 20 mA (max. burden < 500 Ohm) Scaling: 0 to maximum flow rate (see tables on pages 10-15) Accuracy: 0.06 mA
Pulse output:	1 pulse per m³ (see pulse diagram on page 8), max. voltage: pulse +P = +VB, active signal max. flow I = 10 mA
Power supply:	12 to 30 VDC
Power input:	max. 80 mA at 24 VDC
Accuracy: with meas. section	± 3% m.v. ± 2% m.v. (option via 5 point ISO precision calibration) These data are just valid in connection with a measuring section.
Accuracy: without meas. section	± 4% m.v. ± 3% m.v. (option via 5 point ISO precision calibration) These data are just valid in case of correctly programmed inner diameter
Display:	128 x 64 pixel, with backlighth Measures values in maximum 6 digits, Counter max. up to 99,999,999 l resp. m³ drops then back to 0
Units: selectable via software	m³/h (standard factory settings) m³/min, l/min, l/s, ft/min, cfm
Screw-in thread:	1/2"
Material:	Probe tube and screwing: stainless steel 1,4301

INSTRUMENTS DESCRIPTION

The DB40 is a consumption sensor with display for consumption measurement of compressed air and gases indicating the actual consumption in m^3/h and the counter in m^3 .

Special features:

- Integrated display for m^3/h and m^3
- Depth scale for accurate installation
- Usable from tube diameter 1/2"
- Easy installation under pressure
- 4...20 mA analogue output for m^3/h resp. m^3/min
- Pulse output for m^3
- Inner diameter adjustable via keyboard
- Consumption counter resettable

Programming via Service Software SFA 300.

- Analogue output 4...20 mA scalable
- Switching between m^3/h , m^3/min , ft^3/min , l/min , l/s , cfm , m/s
- Reading out the service data

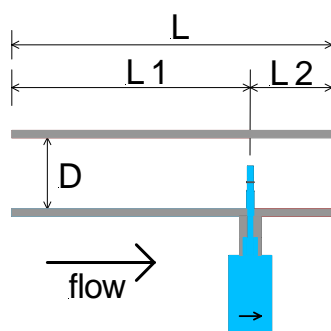
INSTALLATION DESCRIPTION

Determining the point of installation

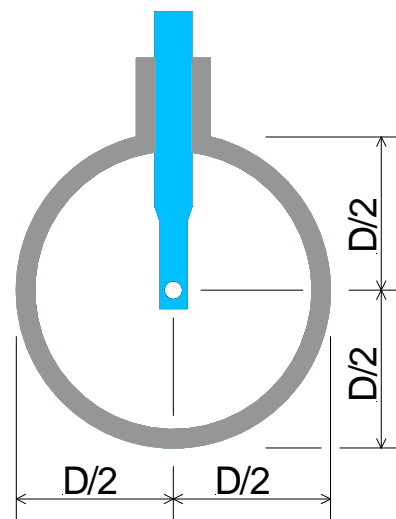
In order to maintain the accuracy stipulated in the data sheets, the sensor must be inserted in the centre of a straight pipe section with an undisturbed flow progression.

An undisturbed flow progression is achieved if the sections in front of the sensor (inlet) and behind the sensor (outlet) are sufficiently long, absolutely straight and without any obstructions such as edges, seams, curves etc.

Careful attention must be paid to the design of the outlet section as obstructions can cause counter-flow turbulence as well as turbulence in the direction of the flow.



- L = Length of the entire measuring section
 $L1$ = Length of inlet section
 $L2$ = Length of outlet section
 D = Diameter of measuring section



INSTALLATION DESCRIPTION

The following table shows the equalising sections necessary in relation to existing obstructions:

Table of inlet and outlet sections

Flow obstruction in front of the measuring section	Minimum length inlet (L1)	Minimum length outlet (L2)
Slight curve (bend < 90°)	12 x D	5 x D
Reduction (pipe narrows towards the meas. section)	15 x D	5 x D
Expansion (pipe expands towards the meas. section)	15 x D	5 x D
90° bend or T piece	15 x D	5 x D
2 bends á 90° on one level	20 x D	5 x D
2 bends á 90° 3-dimensional change of direction	35 x D	5 x D
Shut-off valve	45 x D	5 x D

The respective minimum values required are indicated here.

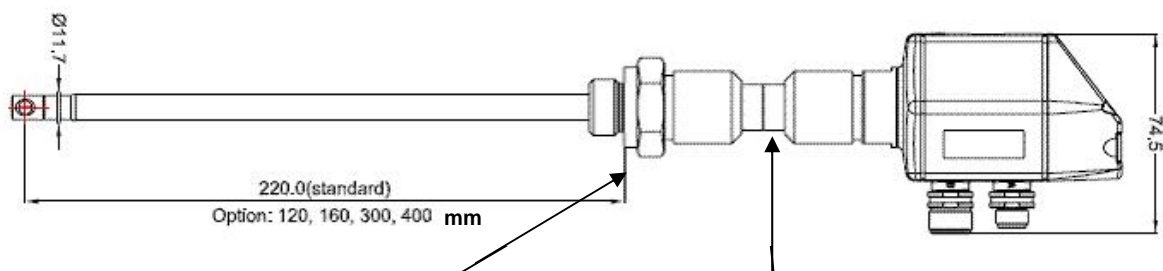
If it is not possible to observe the stipulated equalising sections, considerable deviations in measuring results must be expected.

Sensor installation

Consider the flow direction which should match with the arrows at the connector head.



The sensor head must be placed in the centre of the pipe. Therefore the probe shaft has a scale. To determine the right position measure the length from the marked position to the



Measure from here to the tube center

Read the insertion position here

Hint for the installation with ball valve:

Ball valve R 1/2", DN 15

Passage ball valve minimum Ø15 mm

Assembly instructions

Safety information must be observed.

Assembly is carried out by inserting the connection thread (1/2" thread, A/F 27) into the connection piece. The sensor is then inserted to the required immersion depth and aligned according to the direction of air flow. A depth scale engraved on the probe tube, a flow alignment arrow and an aligning device will be of help to you. Once the sensor has been aligned, the adapter sleeve must be tightened with the stipulated torque (A/F 17).

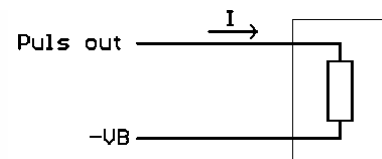
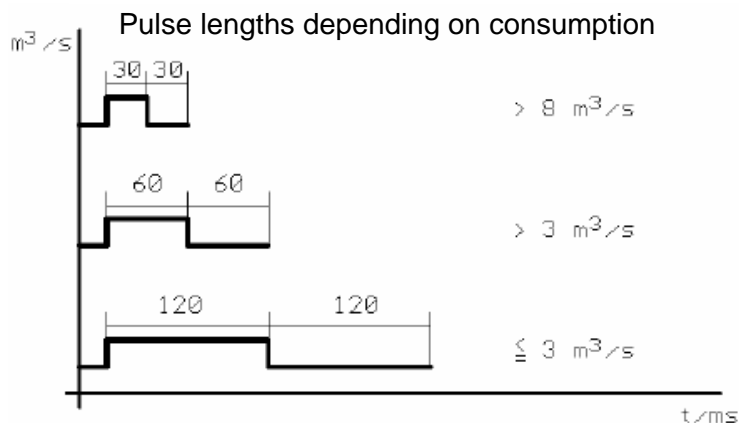
Attention: Alignment of the sensor must not be modified when tightening the connection thread and adapter sleeve. In this case please check the immersion depth and alignment again and correct if necessary. The angular deviation should not be greater than $\pm 2^\circ$ in relation to the ideal position as otherwise the measuring accuracy will decrease.

Commissioning

The valid measuring range and delivery configuration are programmed by the manufacturer on the basis of the user's specifications.

The **stationary** flow and air consumption measuring devices from the VA 400/ DS 300 series function according to the "plug and play" principle. The device is ready for operation as soon as the power supply is connected. .

Pulse output signal indication



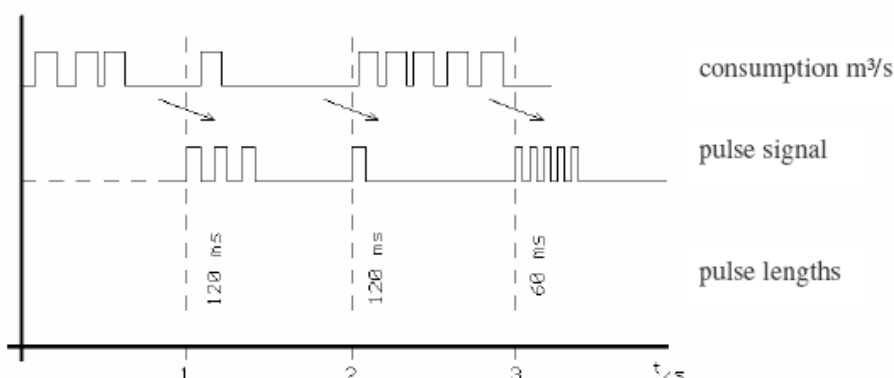
Pulse output:

max. voltage
pulse +P = +VB (12 .. 30 VDC),
active signal
max. current $I = 10 \text{ mA}$

Internal pulse receiver:

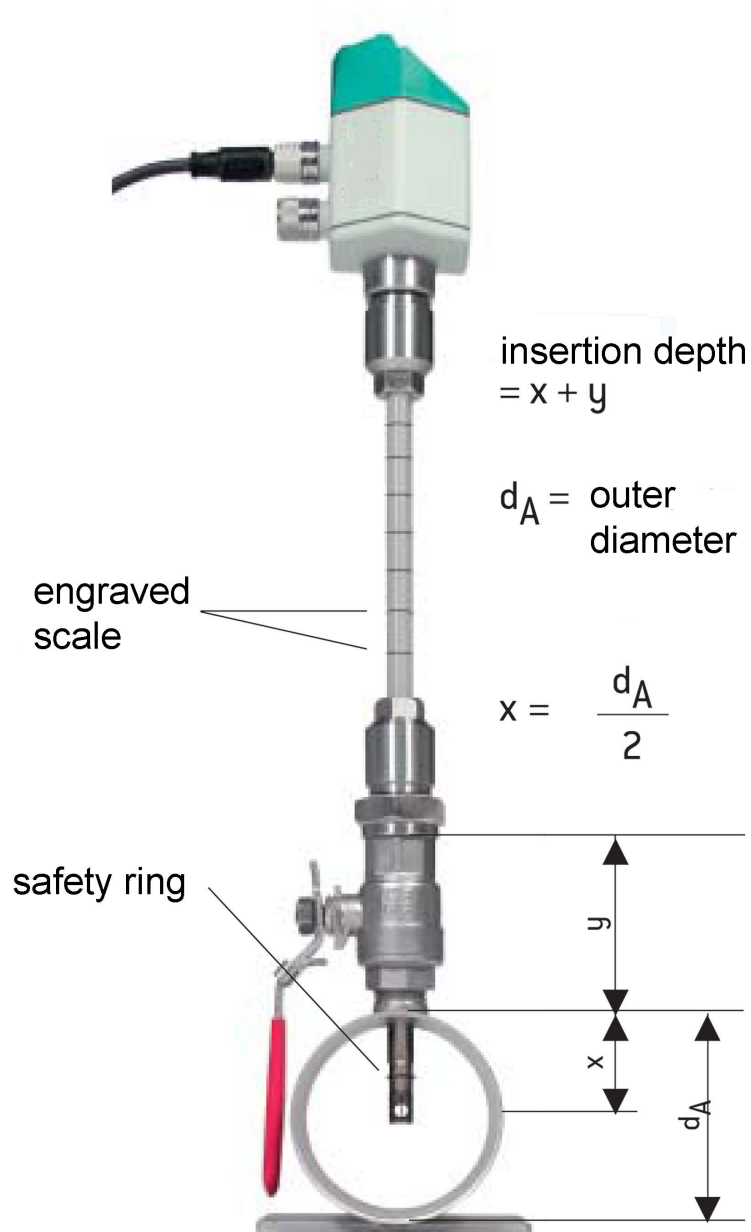
The numbers of m^3 per second are summed up and indicated after one second.

Pulse lengths depending on consumption



Consumption-depending pulse lengths

Flow [m³/sec]	Pulse length [msec]	max. consumption [m³/min]	max. consumption [m³/h]
bis 3	120	180	10800
ab 3	60	480	28800
ab 8	30	960	57600



Measuring ranges depending on the inner diameter of the pipe

The sensor DB40 - standard version with or without display, has a maximum measuring range of **92.7 m/sec**. The flow rate is programmed to:

Inner diameter: **53.1 mm**

This corresponds with an analogue output 4... 20 mA of
 0...600 m³/h 0...10 m³/min 0...10000 l/min 0...166.6 l/sec 0...92.7 m/sec.

In case of the version with display the inner diameter 25.00 has to be set first if the sensor is used in other pipes, e. g. 1", 25 mm.

The analogue output for 1" can be taken from the table below: 4... 20 mA =
 0...122.2 m³/h 0...2.04 m³/min 0...2036.6 l/min 0...33.94 l/sec 0...92.7 m/sec.

In case of the version with display please adjust the respective inner diameter (see page 19).

Inner diameter of the pipe		Flow (final value of measuring range)				max.
Inch	mm	m³/h	m³/min	l/min	l/s	m/s
1/4"	6.0	4.7	0.08	78.7	1.31	92.7
	10.0	15.1	0.25	251.1	4.19	92.7
	15.0	38.9	0.65	648.6	10.81	92.7
1/2"	16.1	45.6	0.76	760.8	12.68	92.7
3/4"	21.7	89.1	1.48	1484.9	24.75	92.7
1"	25.0	122.2	2.04	2036.3	33.94	92.7
	26.0	132.9	2.21	2214.3	36.90	92.7
	27.3	147.5	2.46	2457.5	40.96	92.7
	28.5	162.0	2.70	2699.6	44.99	92.7
	30.0	180.9	3.01	3014.8	50.25	92.7
1 1/4"	32.8	218.8	3.65	3646.2	60.77	92.7
	36.0	266.3	4.44	4437.6	73.96	92.7
	36.3	270.7	4.51	4511.9	75.20	92.7
1 1/2"	39.3	320.1	5.34	5335.7	88.93	92.7
	40.0	332.5	5.54	5541.4	92.36	92.7
	41.9	366.7	6.11	6111.0	101.8	92.7
	43.1	389.4	6.49	6490.4	108.1	92.7
	45.8	441.9	7.37	7365.7	122.7	92.7
2"	50.0	530.6	8.84	8844.1	147.4	92.7
	51.2	557.1	9.29	9285.1	154.7	92.7
	53.1	600.0	10.00	10000	166.6	92.7
	54.5	632.8	10.55	10546	175.7	92.7
	57.5	707.8	11.80	11797	196.6	92.7
	60.0	773.6	12.89	12892	214.8	92.7
	64.2	888.9	14.81	14814	246.9	92.7

Measuring ranges depending from the inner diameter of the pipe
Sonde DB40 - standard version up to 92.7 m/sec.

Inner diameter of the pipe		Flow (final value of measuring range)				max.
Inch	mm	m³/h	m³/min	l/min	l/s	m/s
2 1/2"	65.0	913.5	15.22	15224	253.7	92.7
	70.3	1071.1	17.85	17851	297.5	92.7
	71.1	1095.6	18.26	18260	304.3	92.7
	76.1	1258.2	20.97	20969	349.4	92.7
3"	80.0	1390.4	23.17	23173	386.2	92.7
	81.0	1425.4	23.76	23756	395.9	92.7
	82.5	1480.5	24.67	24674	411.2	92.7
	84.9	1569.8	26.16	26162	436.0	92.7
	90.0	1766.1	29.44	29435	490.6	92.7
4"	100.0	2183.1	36.38	36384	606.4	92.7
	107.1	2507.1	41.78	41784	696.4	92.7
	110.0	2644.7	44.08	44077	734.6	92.7
5"	125.0	3423.3	57.1	57055	950.9	92.7
	133.7	3921.1	65.4	65351	1089.2	92.7
6"	150.0	4941.4	82.4	82356	1372.6	92.7
	159.3	5579.8	93.0	92996	1549.9	92.7
	182.5	7323.4	122.1	122055	2034.3	92.7
	190.0	7947.1	132.5	132451	2207.5	92.7
8"	200.0	8816.2	146.9	146936	2448.9	92.7
	206.5	9398.5	156.6	156642	2610.7	92.7
10"	250.0	13775	229.6	229587	3826.5	92.7
	260.4	14945	249.1	249086	4151.4	92.7
12"	300.0	19836	330.6	330606	5510.1	92.7
	309.7	21139	352.3	352331	5872.2	92.7
	339.6	25418	423.6	423646	7060.8	92.7
	388.8	33317	555.3	555291	9254.9	92.7
	500.0	55101	918.4	918350	15305	92.7
	600.0	79345	1322	1322424	22040	92.7
	700.0	107998	1800	1799966	29999	92.7
	800.0	141058	2351	2350976	39182	92.7
	900.0	178527	2975	2975455	49590	92.7
	1000.0	220404	3673	3673401	61223	92.7

Measuring ranges depending from the inner diameter of the pipe

The sensor **DB40 . H1 version with or without display**, has a maximum measuring range of **185.0 m/sec**. The flow rate is programmed to:

Inner diameter: **53.1 mm**

This corresponds with an analogue output 4... 20 mA of
 0...1197.59 m³/h 0...19.96 m³/min 0...19959.88 l/min 0...332.66 l/sec 0...185.0 m/sec.

In case of the version with display the inner diameter 25.00 has to be set first if the sensor is used in other pipes, e. g. 1", 25 mm.

The analogue output for 1" can be taken from the table below: 4... 20 mA =
 0...243.88 m³/h 0... 4.06 m³/min 0...4064.73 l/min 0...67.75 l/sec 0...185.0 m/sec.

In case of the version with display please adjust the respective inner diameter (see page 19).

Inner diameter of the pipe		Flow (final value of measuring range)				max.
Inch	mm	m³/h	m³/min	l/min	l/s	m/s
1/4"	6.0	9.42	0.16	156.92	2.62	185.0
	10.0	30.08	0.50	501.28	8.35	185.0
	15.0	77.68	1.29	1294.61	21.58	185.0
1/2"	16.1	90.98	1.52	1516.31	25.27	185.0
3/4"	21.7	177.84	2.96	2963.94	49.40	185.0
1"	25.0	243.88	4.06	4064.73	67.75	185.0
	26.0	265.20	4.42	4419.99	73.67	185.0
	27.3	294.72	4.91	4912.02	81.87	185.0
	28.5	323.32	5.39	5388.74	89.81	185.0
	30.0	361.08	6.02	6017.98	100.30	185.0
1 1/4"	32.8	436.69	7.28	7278.17	121.30	185.0
	36.0	531.48	8.86	8857.96	147.63	185.0
	36.3	541.06	9.02	9017.70	150.29	185.0
1 1/2"	39.3	639.84	10.66	10664.07	177.73	185.0
	40.0	663.68	11.06	11061.30	184.35	185.0
	41.8	728.41	12.14	12140.14	202.34	185.0
	43.1	777.34	12.96	12955.60	215.93	185.0
	45.8	882.17	14.70	14702.79	245.05	185.0
2"	50.0	1059.23	17.65	17653.79	294.23	185.0
	51.2	1112.05	18.53	18534.19	308.90	185.0
	53.1	1197.59	19.96	19959.88	332.66	185.0
	54.5	1263.13	21.05	21052.15	350.87	185.0
	57.5	1414.66	23.58	23577.72	392.96	185.0
	60.0	1544.12	25.74	25735.30	428.92	185.0
	64.2	1774.33	29.57	29572.14	492.87	185.0

Measuring ranges depending from the inner diameter of the pipe

Sensor **DB40 - H1** version up to **185.0 m/sec.**

Inner diameter of the pipe		Flow (final value of measuring range)				max.
Inch	mm	m³/h	m³/min	l/min	l/s	m/s
2 1/2"	65.0	1821.03	30.35	30350.57	505.84	185.0
	70.3	2137.86	35.63	35631.08	593.85	185.0
	71.1	2186.80	36.45	36446.65	607.44	185.0
3"	76.1	2511.24	41.85	41853.97	697.57	185.0
	80.0	2778.58	46.31	46309.59	771.83	185.0
	82.5	2958.51	49.31	49308.50	821.81	185.0
4"	84.9	3133.15	52.22	52219.09	870.32	185.0
	90.0	3525.11	58.75	58751.80	979.20	185.0
	100.0	4357.22	72.62	72620.27	1210.34	185.0
5"	107.1	5003.91	83.40	83398.43	1389.97	185.0
	110.0	5278.56	87.98	87976.01	1466.27	185.0
	125.0	6824.50	113.74	113741.61	1895.69	185.0
6"	133.7	7807.53	130.13	130125.42	2168.76	185.0
	150.0	9839.04	163.98	163984.07	2733.07	185.0
	159.3	11096.91	184.95	184948.45	3082.47	185.0
8"	182.5	14581.94	243.03	243032.33	4050.54	185.0
	190.0	15805.08	263.42	263418.04	4390.30	185.0
	200.0	17533.48	292.22	292224.67	4870.41	185.0
10"	206.5	18691.68	311.53	311527.93	5192.13	185.0
	250.0	27428.75	457.15	457145.91	7619.10	185.0
	260.4	29793.76	496.56	496562.71	8276.05	185.0
12"	300.0	39544.48	659.07	659074.72	10984.58	185.0
	309.7	42143.03	702.38	702383.91	11706.40	185.0
	339.6	50673.25	844.55	844554.17	14075.90	185.0
	400.0	70301.30	1171.69	1171688.40	19528.14	185.0
	500.0	109845.79	1830.76	1830763.12	30512.72	185.0
	600.0	158177.93	2636.30	2636298.89	43938.31	185.0
	700.0	215297.74	3588.30	3588295.71	59804.93	185.0
	800.0	281205.22	4686.75	4686753.58	78112.56	185.0
	900.0	355900.35	5931.67	5931672.51	98861.21	185.0
	1000.0	439383.15	7323.05	7323052.48	122050.87	185.0

Measuring ranges depending from the inner diameter of the pipe

The sensor **DB40 - H2 version with or without display**, has a maximum measuring range of **224.0 m/sec**. The flow rate is programmed to:

Inner diameter: **53.1 mm**

This corresponds with an analogue output 4... 20 mA of
 0... 1450.06 m³/h 0... 24.17 m³/min 0... 24167.64 l/min 0...402.79 l/sec 0... 224.0 m/sec.

In case of the version with display the inner diameter 25.00 has to be set first if the sensor is used in other pipes, e. g. 1", 25 mm.

The analogue output for 1" can be taken from the table below: 4... 20 mA =
 0... 295.30 m³/h 0... 4.92 m³/min 0... 4921.62 l/min 0... 82.03 l/sec 0... 224.0 m/sec.

In case of the version with display please adjust the respective inner diameter (see page 19).

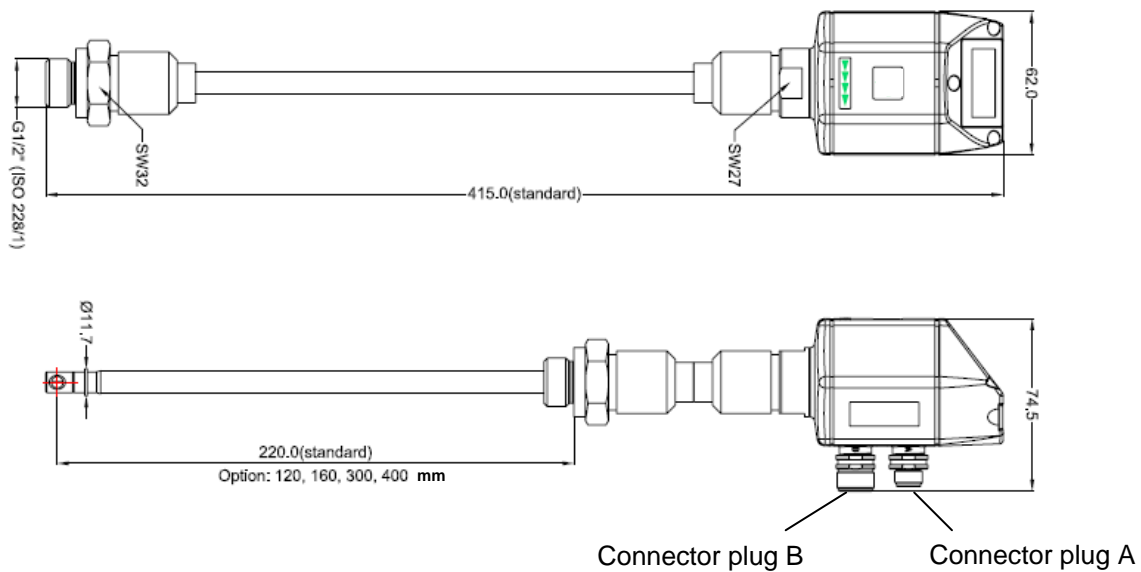
Inner diameter of the pipe		Flow (final value of measuring range)				max.
Inch	mm	m³/h	m³/min	l/min	l/s	m/s
1/4"	6.0	11.40	0.19	190.00	3.17	224.0
	10.0	36.42	0.61	606.96	10.12	224.0
	15.0	94.05	1.57	1567.53	26.13	224.0
1/2"	16.1	110.16	1.84	1835.96	30.60	224.0
3/4"	21.7	215.33	3.59	3588.77	59.81	224.0
1"	25.0	295.30	4.92	4921.62	82.03	224.0
	26.0	321.11	5.35	5351.77	89.20	224.0
	27.3	356.85	5.95	5947.52	99.13	224.0
	28.5	391.48	6.52	6524.74	108.75	224.0
	30.0	437.20	7.29	7286.64	121.44	224.0
1 1/4"	32.8	528.75	8.81	8812.49	146.87	224.0
	36.0	643.52	10.73	10725.32	178.76	224.0
	36.3	655.12	10.92	10918.73	181.98	224.0
1 1/2"	39.3	774.73	12.91	12912.18	215.20	224.0
	40.0	803.59	13.39	13393.14	223.22	224.0
	41.8	881.96	14.70	14699.41	244.99	224.0
	43.1	941.21	15.69	15686.78	261.45	224.0
	45.8	1068.14	17.80	17802.30	296.71	224.0
2"	50.0	1282.52	21.38	21375.40	356.26	224.0
	51.2	1346.48	22.44	22441.40	374.02	224.0
	53.1	1450.06	24.17	24167.64	402.79	224.0
	54.5	1529.41	25.49	25490.17	424.84	224.0
	57.5	1712.89	28.55	28548.16	475.80	224.0
	60.0	1869.63	31.16	31160.58	519.34	224.0
	64.2	2148.38	35.81	35806.27	596.77	224.0

Measuring ranges depending from the inner diameter of the pipe

Sensor **DB40 - H2** version up to **224.0 m/sec.**

Inner diameter of the pipe		Flow (final value of measuring range)				max.
Inch	mm	m ³ /h	m ³ /min	l/min	l/s	m/s
2 1/2"	65.0	2204.93	36.75	36748.79	612.48	224.0
	70.3	2588.55	43.14	43142.50	719.04	224.0
	71.1	2647.80	44.13	44129.99	735.50	224.0
	76.1	3040.63	50.68	50677.24	844.62	224.0
3"	80.0	3364.33	56.07	56072.15	934.54	224.0
	82.5	3582.20	59.70	59703.26	995.05	224.0
	84.9	3793.65	63.23	63227.43	1053.79	224.0
	90.0	4268.24	71.14	71137.32	1185.62	224.0
4"	100.0	5275.76	87.93	87929.41	1465.49	224.0
	107.1	6058.78	100.98	100979.72	1683.00	224.0
	110.0	6391.34	106.52	106522.31	1775.37	224.0
	125.0	8263.17	137.72	137719.57	2295.33	224.0
5"	133.7	9453.44	157.56	157557.27	2625.95	224.0
	150.0	11913.22	198.55	198553.68	3309.23	224.0
	159.3	13436.25	223.94	223937.58	3732.29	224.0
	182.5	17655.97	294.27	294266.18	4904.44	224.0
6"	190.0	19136.96	318.95	318949.42	5315.82	224.0
	200.0	21229.73	353.83	353828.78	5897.15	224.0
	206.5	22632.08	377.20	377201.39	6286.69	224.0
	250.0	33211.03	553.52	553517.21	9225.29	224.0
8"	260.4	36074.61	601.24	601243.50	10020.73	224.0
	300.0	47880.89	798.01	798014.80	13300.25	224.0
	309.7	51027.24	850.45	850454.04	14174.23	224.0
	339.6	61355.72	1022.60	1022595.32	17043.26	224.0
10"	400.0	85121.58	1418.69	1418692.98	23644.88	224.0
	500.0	133002.47	2216.71	2216707.78	36945.13	224.0
	600.0	191523.55	3192.06	3192059.20	53200.99	224.0
	700.0	260684.83	4344.75	4344747.24	72412.45	224.0
12"	800.0	340486.31	5674.77	5674771.91	94579.53	224.0
	900.0	430927.99	7182.13	7182133.20	119702.22	224.0
	1000.0	532009.87	8866.83	8866831.11	147780.52	224.0

DRAWING OF THE INSTRUMENT/INSTRUMENTS DIMENSIONS



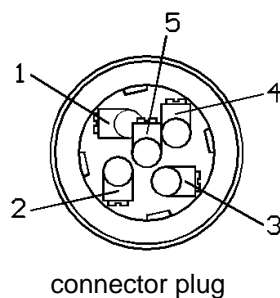
		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
DB40	Connector plug A	SDI	-VB	+VB	+I 4... 20 mA	+P Pulse
	Connection cable A 0554.0104 (5 m) 0554.0105 (10 m)	brown	white	glue	black	grey
	Connector plug B*	NC	NC	NC	NC	NC

SDI	Digital signal (internal data transfer)
-VB	Negative supply voltage 0 V
+VB	Positive supply voltage 12...30 VDC smoothed
+I	Positive 4...20 mA signal
+P Impuls	Pulse output +VB see page 7
NC	Not connected

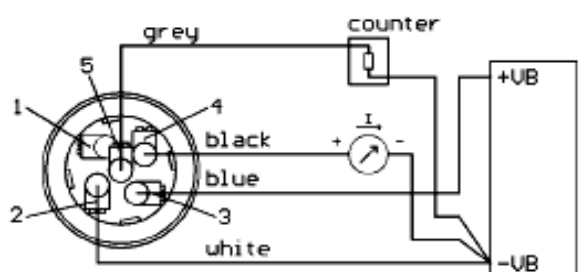
*Connector plug B without any function! Just for internal use!

M12 connector plug A

If no connection cable (0553 0104, 0553 0105) is ordered the sensor will be supplied with a M12 connector plug. the user can connect the supply and signal cables as indicated in the connection diagram.



connector plug



Maintenance

The sensor head should be checked regularly for dirt and cleaned if necessary. Should dirt, dust or oil accumulate on the sensor element, a deviation will occur in the measuring value. An annual check is recommended. Should the compressed air be heavily soiled this interval must be shortened.

Cleaning of the sensor head

The sensor head can be cleaned by carefully moving it to and fro in warm water with a small amount of washing-up liquid. Avoid physical intervention on the sensor (e. g. using a sponge or brush). If soiling cannot be removed, service and maintenance must be carried out by the manufacturer.

Re-calibration

If no customer specifications are given then we recommend to carry out calibration every 12 months. For this purpose the sensor must be sent to the manufacturer.

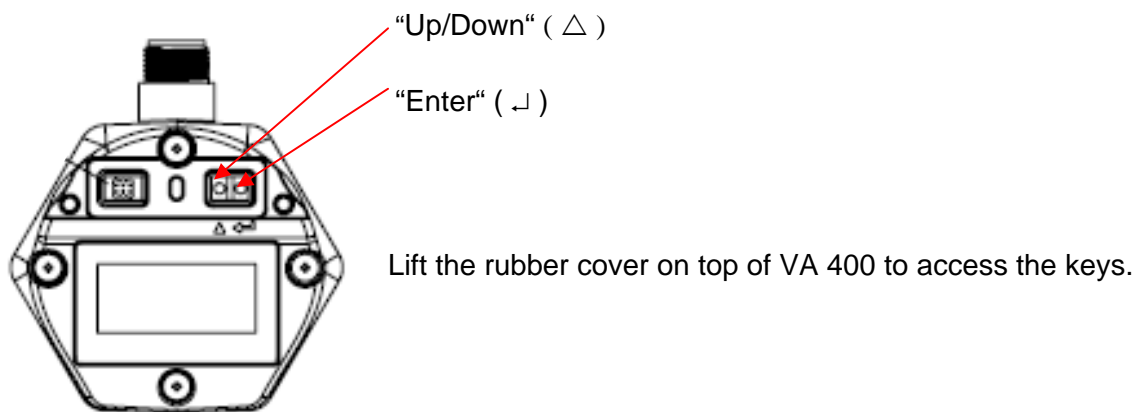
Spare parts and repair

For reasons of measuring accuracy spare parts are not available. If parts are faulty they must be sent to the supplier for repair.

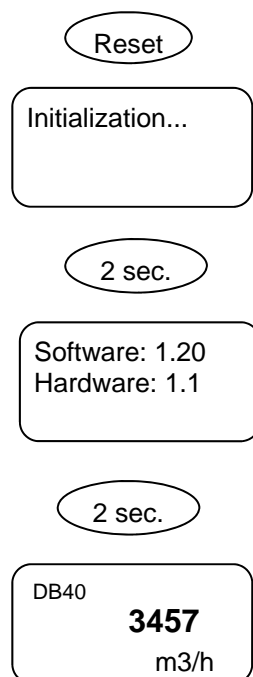
If the measuring device is used in important company installations we recommend to keep a spare measuring system ready.

Calibration certificates

Calibration certificates are issued by the manufacturer on request. This is a fee-paying service. Precision is tested with PTB (German National Metrology Institute) volume flow nozzles.



Normal display function



After power on, the display will go through an initialisation procedure and will show finally the actual on-line values.

Ex factory DB40 is programmed to show volumetric flow and total consumption. Via the configuration menu up to 3 channels can be configured for on-line display. VA 400 will toggle between the channels every 2 seconds

Special indicators:



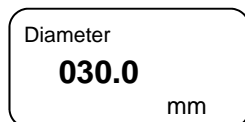
The DB40 is configured to be connected to DS 300.



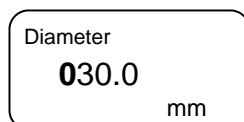
If this symbol is shown in front of the measurement value, it indicates that the value is out of valid measurement ranges. The value will be blinking.

Diameter setting

By pressing the Enter button the current diameter setting can be shown.



In order to change the diameter value, keep the Enter button pressed for 3 seconds. Then the first digit will start blinking and can be changed with the Up key.



Every digit is confirmed by Enter (↵). After confirming the last digit, a system reset is performed and the DB40 will continue with the new setting in normal operation mode.

Configuration setting

The DB40 is usually configured ex factory according to the customer settings ordered. In case settings have to be changed, the user has to keep the Enter key (↵) pressed while powering up the device.

IS DS 300 connected?

Yes / No

Enter "Yes" if there is a DS 300 connected to the DB40, otherwise No. Confirm setting with Enter key (↵).

Display 1

Volume flow

The DB40 can display up to 3 channels, which are volumetric flow or mass flow, velocity and total consumption. Use the Up-key to select the desired channel. If no further channel is wanted, please select "nothing". The channels are toggled during normal operation mode every 2 seconds.

Consumption

3457

In this step the total consumption counter can be reset to zero.

Contrast setting

Up change
Enter OK

Display contrast can be adjusted.

Save changes

No Yes

Press Enter-key to confirm the setting changes or press Up-key to discard all changes.

CALIBRATION/ADJUSTMENT

According to DIN ISO certification of the measuring instruments we recommend to calibrate and if applicable to adjust the instruments regularly from the manufacturer. The calibration intervals should comply with your internal specification. According to DIN ISO we recommend a calibration interval of one year for the instrument DB40.

WARRANTY

If you have reason for complaint we will of course repair any faults free of charge if it can be proven that they are manufacturing faults. The fault should be reported immediately after it has been found and within the warranty time guaranteed by us. Excluded from this warranty is damage caused by improper use and non adherence to the instruction manual.

The warranty is also cancelled once the instrument has been opened - as far as this has not been mentioned in the instruction manual for maintenance purposes - or if the serial number in the instrument has been changed, damaged or removed.

The warranty time for the DB40 is 12 months. If no other definitions are given the accessory parts have a warranty time of 6 months. Warranty services do not extend the warranty time.

If in addition to the warranty service necessary repairs, adjustments or similar are carried out the warranty services are free of charge but there is a charge for other services such as transport and packaging costs. Other claims, especially those for damage occurring outside the instrument, are not included unless responsibility is legally binding.

After sales service after the warranty time has elapsed

We are of course there for you even after the warranty time has elapsed. In case of malfunctions please send us the instrument with a short-form description of the fault. Please do not forget to indicate your telephone number so that we can call you in case of any questions.

ORDERING DATA

see data sheet in appendix

DB40

Thermal mass flow meters and counters for compressed air and non-aggressive gases

- **insertion model**
- **available for DN25 (1") to DN600 (24") pipe sizes**
- **for flow velocities: 0–92.7m/s, 0–185 m/s and 0–224 m/s**
- **optional local LCD display for flow rate and total**
- **output signals: 4 to 20 mA for flow rate, pulses for totalization**



Description:

Model DB40 thermal mass flow meters and counters report and measure mass flow rates and totals of non-aggressive gases, regardless of gas pressure and temperature. Process gas flows around a heated temperature sensor that is encapsulated in glass. As a result, the sensor dissipates heat which an electronics module returns to the sensor to maintain it at a constant temperature. The dissipated heat energy is proportional to the mass flow rate of the gas and is output as a 4 to 20 mA signal by the electronic utilizing calibration curves and process parameters stored in the instrument. The 4 to 20 mA signal is routed to secondary evaluation devices and provides the flow rate information. An additional pulse output with a pre-defined pulse value is used for totalizing purposes. Mass flow rate and total may also be displayed on an integrated back-lit display if required. The instruments are supplied with a 1/2" thread compression fitting and can be installed and disassembled under pressurized conditions.

Typical Applications:

Model DB40 thermal mass flow meters and counters provide flow measurement of non-aggressive gases in DN25 to DN600 pipe systems. Their rugged, heavy-duty design and easy handling and operation make them the right choice for measuring and monitoring compressed air consumption levels. They also provide measurements of other suitable gases such as: nitrogen oxygen, argon, helium and carbon dioxide.

Models:

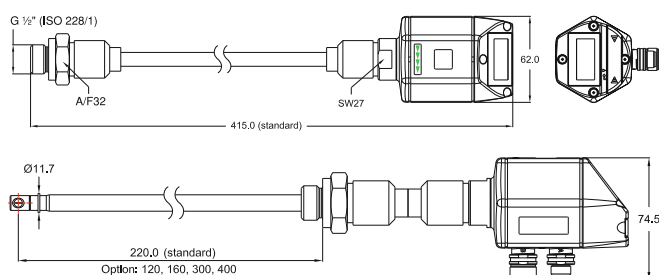
DB40.S...	standard model, mass flow rate 0–92.7 m/s, ½" male thread
DB40.H1...	mass flow rate 0–185 m/s ½" male thread
DB40.H2...	mass flow rate 0–224 m/s ½" male thread

Measuring ranges:

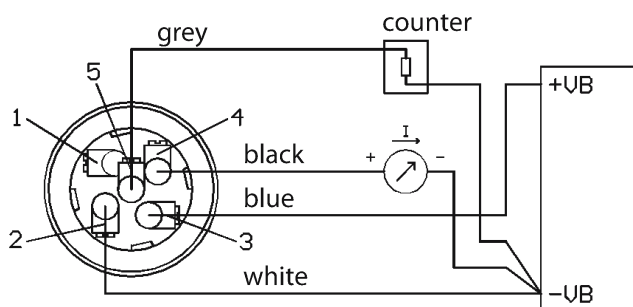
The quoted measuring ranges are a rough guide only. The exact measuring ranges are calculated taking the actual inside diameter of the given pipe into account and are used during production to calibrate the instruments.

Process connection (DN) and pipe ID (mm)	Upper end value (20 mA) in Nm³/h			Recommended probe length (mm)
	DB40.S 0–92,7 m/s	DB40.H1 0–185 m/s	DB40.H2 0–224 m/s	
25 (1")	122	244	295	120
32 (1 ¼")	219	437	529	
40 (1 ½")	333	640	775	
50 (2")	530	1,060	1,280	160
65 (2 ½")	915	1,820	2,200	
80 (3")	1,390	2,780	3,365	
100 (4")	2,185	4,360	5,275	
125 (5")	3,425	6,825	8,260	220
150 (6")	4,940	9,840	11,910	
200 (8")	8,820	17,530	21,230	
250 (10")	13,740	27,430	33,210	
300 (12")	19,840	39,540	47,880	300
400 (16")	33,320	70,300	85,120	
500 (20")	55,100	109,850	133,000	
400 (24")	79,350	158,180	191,520	600

Dimensions:



Electrical Connection:



Ordering Code:

Order Number: DB40. G. 15. L. 0

Thermal mass flow meters and counters
for gases – insertion model

Measuring ranges (see table):

S = 0 to 92.7 m/s (standard)

H1 = 0 to 185 m/s

H2 = 0 to 224 m/s

Probe lengths:

12 = 120 mm

16 = 160 mm

22 = 220 mm (standard)

30 = 300 mm

40 = 400 mm

Process gas:

L = air

N = nitrogen

A = argon

H = helium

C = carbon dioxide

S = oxygen

Options:

0 = none

D = with LCD-display

9 = please specify in writing

Other information: inside pipe diameter in mm (please specify when placing your order, is needed to calculate the exact measuring range.)

Accessories:

DB40-Z.M installation kit, containing a weld-on fitting and ½" ball valve made of stainless steel

DB40-Z.L5 5 m cable with matching plug

DB40-Z.L10 10 m cable with matching plug

DB40-Z.N1 Wall mounted power supply, 100-240 VAC, 10 VA on 24 VDC, 0.35 A

DB40-Z.N2 plug-in power supply unit, 100-240 VAC on 24 VDC, 0.35 A, with 2 m cable

DB40-Z.K5 factory calibration, 5 points

Technische Daten:

max. pressure: 50 bar

Process gas

temperature: -30 to +110 °C

Measurement uncertainty: ± 4% of measured value

(± 3% with factory calibration)

Probe length: refer to "Measuring ranges" table

Mounting position: any

Voltage supply: 12–30 VDC

Outputs : 4 to 20 mA (max. load 500 ohm), pulses (1 pulse/m³), other pulse values available on request

Display (option D): LCD, for flow rate in Nm³/h, for total in Nm³ (other units available on request)

Electrical

protection: IP65

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